FLOOD INSURANCE STUDY

DORCHESTER COUNTY, MARYLAND

AND INCORPORATED AREAS

Community	CID
Brookview, Town of	240097
Cambridge, City of	240098
Church Creek, Town of	240101
Dorchester County (Unincorporated Areas)	240026
East New Market, Town of *	240121
Eldorado, Town of	240105
Galestown, Town of	240106
Hurlock, Town of	240112
Secretary, Town of	240123
Vienna, Town of	240127

*No Special Flood Hazard Areas Identified

Please note: this Revised Preliminary FIS Report only includes revised data. The unrevised components will appear in the final FIS Report.

REVISED PRELIMINARY DATE: OCT. 24, 2013

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER

24019CV000B

NOTICE TO FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) report may not contain all data available within the Community Map Repository. Please contact the Community Map Repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial countywide FIS Effective Date:	May 24, 2011 – to add Base Flood Elevations, to change Special Flood Hazard Areas, to update map format, and to reflect updated topographic information
Revised countywide FIS Dates:	TBD – to update the effects of wave action

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The unrevised components will appear in the final FIS Report.**

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FLOOD INSURANCE STUDY
DORCHESTER COUNTY, MARYLAND AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates previous FIS reports and/or Flood Insurance Rate Maps (FIRMs) for the geographic area of Dorchester County, Maryland, and its incorporated areas including the Towns of Brookview, Church Creek, Eldorado, Galestown, Hurlock, Vienna and Secretary, the City of Cambridge, and the unincorporated areas of Dorchester County (hereinafter referred to collectively as Dorchester County). This information will be used by Dorchester County to update any existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP). The information will also be used by local and regional planners to further promote sound land use and floodplain development.

Please note that on the effective date of this study, the Town of East New Market has no identified Special Flood Hazard Areas (SFHAs). This does not preclude future determinations of SFHAs that could be necessitated by changed conditions affecting the community (i.e. annexation of new lands) or the availability of new scientific or technical data about flood hazards.

Please note that the Town of Federalsburg is geographically located in Caroline and Dorchester Counties. The Town of Federalsburg is shown in its entirety in the Caroline County FIS (FEMA 1998). See the separately published FIS report and FIRMs for countywide map dates and flood hazard information outside of Dorchester County.

In some States or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgements

The sources of authority for this FIS are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The original May 24, 2011 countywide FIS was prepared to include all jurisdictions within Dorchester County into a countywide format FIS.

Information on the authority and acknowledgments for each jurisdiction with a previously printed FIS report included in this countywide FIS is shown below.

The hydrologic and hydraulic analyses for the May 24, 2011 FIS were performed by the U.S. Army Corps of Engineers (USACE) for Maryland Department of Environment (MDE) as part of the Federal Emergency Management Agency's (FEMA) Map Modernization Program (MMP) under Contract No. ICA-05-CRL-01. The MMP study was completed in September 2008.

The May 24, 2011 FIS is a revision and compilation of five existing FIS studies in Dorchester County, Maryland: the City of Cambridge, the Town of Church Creek, Dorchester County (Unincorporated Areas), the Town of Hurlock, and the Town of Secretary. These FISs were prepared by the Flood Management Division of the Maryland Water Resources Administration of the State of Maryland, for the Federal Insurance Administration (FIA) under Contract No. H—4544, and were completed on July 16, 1980, October 18, 1988, April 15, 1981, July 16, 1980, and April 2, 1992, respectively (FEMA 1980a, 1988, 1981, 1980b, and 1992).

There are no previous FIS Reports published for the Towns of Eldorado and Vienna; therefore, the previous authority and acknowledgments for these communities are not included in this FIS.

For this revision, the coastal analyses and mapping was conducted for FEMA under Project HSFE03-06-X-0023, "NFIP Coastal Storm Surge Model for Region III" and Project HSFE03-09-X-1108, "Phase II Coastal Storm Surge Model for FEMA Region III." The USACE and project partners assisted FEMA in the development and application of a state-of-the-art storm surge risk assessment capability for the FEMA Region III domain which includes the Delaware Bay, Chesapeake Bay, District of Columbia, Delaware-Maryland-Virginia Eastern Shore. The work was performed by the Coastal Processes Branch (HF-C) of the Flood and Storm Protection Division (HF), U.S. Army Engineer Research and Development Center – Coastal & Hydraulics Laboratory (ERDC-CHL).

The FIRM was prepared using the Universal Transverse Mercator (UTM) zone 18N projection. The horizontal datum used is North American Datum of 1983 (NAD83), GRS80 spheroid. Differences in datum, spheroid, projection, or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdictional boundaries.

The base map information shown on the revised FIRM was provided by the National Agriculture Imagery Program (NAIP), dated 2009. NAIP acquires digital ortho imagery during the agricultural growing seasons in the continental U.S. at a scale of 1:40,000 for the purpose of producing natural color digital orthophotos at a 1 meter pixel resolution.

1.3 Coordination

The purpose of the initial Consultation Coordination Officer (CCO) meeting is to discuss the scope of the FIS. A final CCO meeting is held to review the results of the study.

The initial CCO meetings for studies prior to May 24, 2011 were held on different days. The Town of Hurlock and the unincorporated areas of Dorchester County held their CCO meetings on June 8, 1977 and the meetings were attended by representatives of the FIA, Dorchester County, the Town of Hurlock, and the study contractor. The Town of Secretary was notified of the initiation of the FIS by FEMA on January 10, 1991. Further administrative coordination occurred with the USACE, the U.S. Geological Survey (USGS), Dorchester County officials, the Soil Conservation Service, and the Virginia Institute of Marine Science (VIMS).

Final CCO meetings for studies prior to May 24, 2011 were held on different days. For the Town of Hurlock and the unincorporated areas of Dorchester County, the final CCO meetings were held on March 6, 1980 and February 19, 1981 and were attended by the FIA, Dorchester County, the Town of Hurlock, and the study contractor. For the Town of Church Creek, the final CCO meeting was held on November 6, 1986 and attended by FEMA and town officials.

For the May 24, 2011 study, the initial CCO meeting was held on April 12, 2005 at the MDE offices and attended by representatives of MDE, FEMA, and USACE (study contractor for this study).

Coordination with City officials and Federal, State, and regional agencies produced information pertaining to floodplain regulations, community maps, flood history, and other hydrologic data.

For this revision, the FEMA Region III office initiated a coastal storm surge study in 2008 for the Atlantic Ocean, the Chesapeake Bay and its tributaries, and the Delaware Bay. Therefore, no initial CCO meeting for the coastal storm surge study were held.

For this revision, a final CCO meeting was held on _____________, with representatives from FEMA, the study contractor, and Dorchester County.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Dorchester County, Maryland, including all unincorporated areas of the county, the Towns of Brookview, Church Creek, Eldorado, Galestown, Hurlock, Secretary, and Vienna, and the City of Cambridge.

All or portions of Higgins Creek, Marshy Hope Creek, and Wright's Branch were studied by detailed methods. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

The USACE's detailed methodology included comparing existing condition hydrology calculations to the results used in the effective FISs (refer to Section 3.1). New georeferenced hydraulic models were created for each stream studied in detail, and the resulting GIS layers (floodplains, cross-sections, and floodways) were used in the development of the updated FIS mapping (refer to Section 3.2).

Flooding in parts of the community with low development potential or minimal flood hazard was studied by approximate methods in previous FISs. The flooding sources studied by approximate methods were: Chicone Creek, Chicamacomico River, Davis Millpond Branch, Gales Creek, North Davis Millpond Branch, Otter Pond Branch, South Davis Millpond Branch, Tributary A, and Wrights Millpond Branch.

USACE's methodology for approximate method streams includes developing the 1-percent annual chance discharge for the stream (refer to Section 3.1), creating new georeferenced hydraulic models, and developing a resulting GIS layer for the 1-percent annual chance inundation area for updated FIS mapping.

For this revision, the FEMA Region III office initiated a study to update the coastal storm surge elevations within the states of Virginia, Maryland, and Delaware, and the District of Columbia including the Atlantic Ocean, Chesapeake Bay including its tributaries, and the Delaware Bay. This effort is one of the most extensive coastal storm surge analyses to date, encompassing coastal floodplains in three states and including the largest estuary in the world. The study will replace outdated coastal storm surge stillwater elevations for all FISs in the study area, and serve as the basis for new coastal hazard analysis and ultimately updated FIRMs. This revision incorporates detailed coastal flood hazard analyses for: the Chesapeake Bay, Choptank River, Little Choptank River, Honga River, Fishing Bay, Hooper Strait, and the Nanticoke River. Study efforts were initiated in 2008 and concluded in 2012.

2.2 Community Description

Dorchester County is located on the eastern shore of Maryland and is bordered to the north by the Choptank River and Caroline County, Maryland; to the east by Sussex County, Delaware; to the south by Wicomico and Somerset Counties, Maryland; and to the west by the Chesapeake Bay. Several islands are a part of Dorchester County including Sharp's, James, Taylor, Barren, Hoopers', and Goldsboroughs Islands. Dorchester County has a total land area of 557 square miles with 1,700 miles of shoreline (Census 2007).

Dorchester County is sparsely populated; the population was 32,618 in 2010, with approximately 60.3 people per square mile (Census 2010). The largest community in Dorchester County, the City of Cambridge, had a 2010 population of 12,326 (Census 2010). The City of Cambridge is the county seat and is undergoing a revitalization. A new Hyatt resort was recently completed and new businesses have been built to serve guests from the new resort (Dorchester First 2005).

Dorchester County consists of predominately unconsolidated sedimentary deposits overlying hard crystalline rocks. It lies within the Atlantic Coastal Plain geologic province. The unconsolidated sediments dip gently toward the southeast at approximately 60 to 100 feet per mile. The deposits are a result of several sea oscillations and consist of clay, silt, sand, and gravel deposited in a wedge—shaped fashion, thickening to the southeast. Many of these deposits are the Piney Point, Aquia, Matawan, Magothy, Raritan and Patapsco aquifers. Geologic pumping records indicate that the Piney Point aquifer will yield up to 3 million gallons per day in Dorchester and Talbot Counties.

Beneath the coastal plain sediments lie older Paleozoic crystalline rocks. The average depth to the crystalline basement is greater than 2,500 feet. Few wells extend into the basement, which limits available information regarding such things as rock structure. It is known, however, that the basement transmits very little groundwater.

The general topography of Dorchester County is flat with an elevation increase from south to north. Nearly 75% of Dorchester County has an elevation of less than 20 feet above sea level. Northern Dorchester County contains the county's highest elevation, 57 feet above sea level where no tidal flooding occurs. The steepest slopes within the county are found adjacent to the Choptank River, the northern boundary of the county, where fluvial processes have created steep river banks. The increasing elevation found in north Dorchester County produces a gently rolling terrain with nearly all of the county's hills located in this area. Southern Dorchester County is very flat and is generally at, or slightly above, sea level and subject to considerable flooding from high tides (Tour Dorchester). The majority of the land in Dorchester County (55.8%) is within the 1-percent chance floodplain (MDE 2005).

The irregular shoreline is a result of drowned river valleys formed by a gradually sinking land mass. This has led to a change in the overall drainage pattern due to widening rivers and creeks. Extensive estuaries and tidal basins have resulted, producing a myriad of waterways.

The soils of Dorchester County are generally low-lying, poorly drained, and require artificial drainage prior to agricultural usage. The soil associations present include the Sassafras-Woodstown, the Mattapex-MataPeake, the Keyport-Mattapex, the Elkton-Othello-Barclay, the Fallsington-Pocomoke, and the Tidal Marsh Associations.

Dorchester County lies within a humid, semi-continental climate where mild winters and hot summers are the rule. The prevailing winds are westerly at an average of 8 to 10 miles per hour.

The average annual temperature of Dorchester County is 57.2 degrees Fahrenheit. July is the hottest month of the year, while January and February are the coldest months. A growing season of 202 days is characteristic for this area. The average annual precipitation is 43 inches with an average snowfall of 13.7 inches per year (Maryland State Climatologist Office).

The Choptank River is a tidally-influenced river which flows into the Chesapeake Bay. Tidal surges extend up the river as far as Greensboro, Maryland, with average tides between 0.4 and 1.6 feet. At Cambridge, the Choptank River is approximately 1.6 miles wide. Near Choptank, Maryland, the river is approximately 0.4 mile wide.

Several depressions exist throughout Dorchester County and are known as Maryland basins. They provide for the storage and infiltration of overland runoff. This aids in groundwater recharge and slows overland runoff in these areas. Several ponds are located throughout the drainage area, most of which were man-made for agricultural use or currently outdated gristmill operations.

2.3 Principal Flood Problems

Storm damage in Dorchester County has resulted from severe thunderstorms that traverse east over the Chesapeake Bay and from tropical storms and hurricanes that follow a northbound route along the Atlantic coastline.

The low-lying, relatively undisturbed topography, high seasonal water tables, and poor drainage-high runoff soils combine to provide a high flooding potential. When heavy rainfall and a high river discharge combine with storm tides, low-lying areas adjacent to the rivers and estuaries become inundated with saltwater. Floods in the Dorchester County area occurred in 1876, 1933, 1935, 1954, 1955, 1960, 1967, 1972, 1975, 1984, 1999, 2003, 2006, 2011, and 2012.

Little is known of the 1876 flood known as the Centennial Storm. Senator J.S. Shepard stated in 1933 that the Centennial Storm resulted in severe damage to the lower section of Dorchester County where thousands of acres were ruined by saltwater flooding. The tide was the highest ever encountered by Dorchester County residents and it flooded all of the waterfront property in Cambridge as well as all of Spring Valley (The Cambridge Record 1933).

On August 22-24, 1933, a tropical storm with more than 50 mile per hour winds struck Dorchester County and brought extremely high tides (The Cambridge Record 1933). The USACE estimated tidal surge heights of 6.9 feet at Choptank, 6.9 feet at Cambridge, and 7.5 feet at Vienna (USACE 1981). The community of Choptank was flooded by 2 feet of water. Extensive damage was reported on Hoopers Island where the bay and the Honga River were merged into one body of water. The Hooper Island Road bridges at Fishing Point and Ferry Point were washed out and one draw tender was drowned. Almost all island crab houses were lost, while uprooted trees knocked out telegraph and telephone services to Cambridge. Tomato and corn crops were extensively damaged by heavy rainfall and flooding. Several road washouts also occurred as a result of the storm. An estimated $500,000 in damage to crops resulted in Dorchester County (The Cambridge Record 1933).

The storm of September 1935 dropped 13 inches of rainfall within a three-day period and created serious flooding problems in several areas of Dorchester County. The storm broke the dam on Smithville Branch, which was under repair at the time.

In October 1954, Hurricane Hazel struck the Eastern Shore and brought winds registering over 100 miles per hour. Tidal surges were reported at 5.5 to 6.0 feet by The Banner, a Cambridge newspaper (The Banner 1954). Toddville was approximately 0.5 foot under water. Marsh grass found hanging on power lines 15 feet above the ground along Wingate Road in the Lakes and Straights District gave evidence of waves at least 15 feet in height. At least 75 large fishing boats were lodged in the marsh 1.5 miles inland. Several residents in the Town of Secretary noted Hurricane Hazel as “the worst storm of memory”. Tides in Secretary reportedly reached the floorboards of the grocery store and barber shop, approximately 2 to 3 feet above normal. There was no other serious damage reported other than slight erosion and general bulkhead damage. Saltwater inundation on farmlands adjacent to the Choptank River and in the Lakes and Straights District created severe crop damage.

Hurricane Connie occurred on August 13, 1955. It generated 7.6 inches of rainfall during a period of approximately 15 hours and the total storm rainfall was 10.16 inches. Damage was not severe; however, roads were flooded. On August 17, 1955, Hurricane Diane brought tides 1.5 to 2 feet above normal. Portions of Hammerbrookes Boulevard and Water Street in Cambridge were flooded. The full force of Hurricane Diane missed the Delmarva Peninsula and Dorchester County.

Hurricane Donna struck on September 16, 1960. Rainfall at the Maryland State Police Barracks near Easton was recorded at 6.01 inches (Star Democrat 1960). No tidal information can be found.

In August 1967, a series of severe thunderstorms hit Talbot, Caroline and Dorchester Counties. The most notable damage was to the State Route 404 crossing at Norwich Creek in the Tuckahoe Creek watershed. The bridge was washed out by rapidly rising floodwaters. The Garland Lake Dam broke and caused $125,000 in damage to highways and property (Star Democrat 1967).

Tropical Storm Agnes brought winds up to 55 miles per hour during late June 1972 (The Banner 1972). At Town Point, 3.22 inches of rainfall were recorded. Some local flooding occurred but damage was primarily restricted to crops. The USACE tidal gage No. 8571890 in Cambridge registered a maximum tidal elevation of 4.06 feet.

Heavy rainfall took place over a five-day period in July 1975. A total of 8 inches of rainfall caused Marshy Hope Creek to flood five homes and caused washouts on Gravel Branch, Jim Andrews, and Blinkhorn Roads. Portions of Horn Point, Dark, Key Wallace, Maple Dam and Liners Roads were covered with water. The tides were estimated to be 6 feet above normal throughout the worst part of the flooding (The Banner 1975).

Heavy rains caused statewide flooding and intense costal erosion, especially along the lower Chesapeake Bay on March 28 – 29, 1984 (MDE 2005).

Hurricane Floyd caused widespread flooding on the northern portion of the Eastern Shores on September 16, 1999 (MDE 2005).

Hurricane Isabel hit the eastern coast and caused widespread tidal surge flooding on September 18-19, 2003 (MDE 2005). In the Eastern Shore of Maryland, Hurricane Isabel produced a storm surge peaking at 8 feet on the Chesapeake Bay side at Hoopers Island (NWS 2003). On September 19, 2003, President George W. Bush declared the entire state of Maryland as a disaster area, which allowed residents affected by the hurricane to apply for federal aid.

A large storm event in June 2006 dropped 3 to 6 inches of rain in most of the county and up to 15 to 18 inches of rain near the northern boundary of the county between June 22 and June 30, 2006 (NWS 2006). This system caused widespread flooding and damage. Many roads were closed due to flooding, and some were washed out, including Palmer Mill Road in the Town of Hurlock (Figure 1). On July 2, 2006, the President Bush declared a Major Disaster for Caroline and Dorchester Counties for federal disaster aid. Officials estimate that flooding caused between $10-12 million in damage to roads and agriculture (WBOC 16).

In September 2011, Hurricane Irene hit the eastern coast and caused substantial damage. On September 16, 2011, President Barack Obama declared the entire eastern portion of the State of Maryland as a disaster area, which allowed residents affected by the hurricane to apply for federal aid.

In October 2012, Hurricane Sandy made landfall north of the State of Maryland, but caused substantial damage in Maryland. President Obama declared the entire State of Maryland as a disaster area, which allowed residents affected by the hurricane to apply for federal aid.


Figure 1. Palmer Mill Road in the Town of Hurlock, June 2006

2.4 Flood Protection Measures

Except for isolated, private earthen dikes constructed for private property tidal protection, no flood protection measures have been undertaken in Dorchester County. Main drainage outlets were straightened, widened, and cleared under a series of Public Drainage Association petitions. Approximately 20 to 30 such projects were undertaken in the 1940s and l950s. These projects were completed using private and public funding; little or no attempt, however, has been made to continue or maintain the improvements. Consequently, they are in a state of disrepair (District Conservation 1981).

The Middletown Branch, Public Law 566 watershed project is primarily a project to drain standing water from existing croplands. The project idea was introduced in the early l960s; however, due to prohibitive costs and environmental delays, there has been no project implementation (USDA 1966).

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 1-percent annual chance flood in any 50-year period is approximately 40 percent (4 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting Dorchester County.

Information on the methods used to determine peak discharge-frequency relationships for the streams studied by detailed methods is shown below.

<u>Pre-countywide Analyses</u>

The effective FISs for Dorchester County included hydrologic analyses for the areas studied in detail. The objectives of the hydrologic portions of the FIS updates are to calculate revised 10-, 2-, 1-and 0.2-percent annual chance flows, along with an ultimate 1-percent annual chance flow, based on regression equations produced by Dr. Glen Moglen of the Department of Civil and Environmental Engineering at the University of Maryland. The ultimate 1-percent annual chance flow is based on floods that can be anticipated when the watershed land-use changes to a future “ultimate development” condition. The current FIS update has an additional objective, to establish 10-, 2-, 1-, ult 1-, and 0.2-percent annual chance flows for streams identified within the effective FIS and FIRM approximate flood zones and previously unstudied areas. Methods and results of the updated hydrologic analyses are presented below.

<u>May 24, 2011 Countywide Analyses</u>

For the May 24, 2011 study, the MDE contracted Dr. Moglen to perform the hydrologic calculations for the FIS.

The regional regression equations being used by the Maryland State Highway Administration were developed by Mr. Jonathan Dillow, a hydrologist for the USGS. Mr. Dillow defined regression equations for five hydrologic fixed regions: Appalachian Plateaus and Allegheny Ridges, Blue Ridge and Great Valley, Piedmont, Western Coastal Plain and Eastern Coastal Plain (Dillow 1996).

Dr. Moglen developed a new set of regression equations, called the fixed region regression equations, for the State of Maryland. The fixed region method used in his study is based on the predefined regions of Mr. Dillow since these regions are based on physiographic regions. Dorchester County is located entirely in the Eastern Coastal Plain Region.

The region regression equations for the Eastern Coastal Plain Region (Table 1) are based on 15 stations in Maryland and 9 stations in Delaware with drainage area (DA) ranging from 2.27 to 112.20 square miles, basin relief (BR) ranging from 5.1 to 43.5 feet, and percent A soils (S_A) ranging from 0.0 to 49.4 percent. Basin relief is not statistically significant for discharges less than the 5-yr event but is included in the equations for consistency. The standard errors range from 33.7 percent (0.142 log units) for Q_{1_50} to 50.8 percent (0.208 log units) for $Q_{500.}$

Table 1. Eastern Coastal Plain Fixed Region Regression Equations

Eastern Coastal Plain Fixed Region Regression Equation	Standard error (percent)	Equivalent years of record
$Q_{1.25} = 19.85\ DA^{0.796}\ BR^{0.066}\ (S_A + 1)^{-0.106}$	34.2	4.5
$Q_{1.50} = 20.48\ DA^{0.795}\ BR^{0.156}\ (S_A + 1)^{-0.140}$	33.7	4.1
$Q_{1.75} = 20.81\ DA^{0.799}\ BR^{0.197}\ (S_A + 1)^{-0.146}$	34.2	4.1
$Q_{2} = 20.95\ DA^{0.803}\ BR^{0.222}\ (S_A + 1)^{-0.144}$	34.9	4.1
$Q_{5} = 25.82\ DA^{0.793}\ BR^{0.368}\ (S_A + 1)^{-0.190}$	36.9	6.8
$Q_{10} = 31.17\ DA^{0.777}\ BR^{0.439}\ (S_A + 1)^{-0.215}$	38.2	9.5
$Q_{25} = 40.26\ DA^{0.751}\ BR^{0.511}\ (S_A + 1)^{-0.242}$	40.0	13
$Q_{50} = 50.00\ DA^{0.732}\ BR^{0.549}\ (S_A + 1)^{-0.261}$	41.7	16
$Q_{100} = 63.44\ DA^{0.711}\ BR^{0.576}\ (S_A + 1)^{-0.279}$	44.0	18
$Q_{200} = 79.81\ DA^{0.689}\ BR^{0.601}\ (S_A + 1)^{-0.296}$	46.5	19
$Q_{500} = 108.7\ DA^{0.660}\ BR^{0.628}\ (S_A + 1)^{-0.316}$	50.8	21

All calculations using the fixed region regression equations were preformed with GISHydro2000. GISHydro is a computer program used to assemble and evaluate hydrologic models for watershed analysis. Originally developed in the mid-1980s, the program combines a database of terrain, land use, and soils data with specialized GIS tools for assembling data and extracting model parameters. The primary purpose of the GISHydro program is to assist engineers in performing watershed analyses in the State of Maryland. In the Fall of 1997, a new collaborative project between the Department of Civil and Environmental

Engineering at the University of Maryland and the Maryland State Highway Administration began to update and enhance GISHydro into GISHydro2000.

It should also be emphasized that these regression equations, although not developed by the USGS, provide better standard error performance than the current USGS regression equations for Maryland and apply to both rural and urban watershed conditions. These equations were endorsed for use in Maryland by the Maryland Hydrology Panel as documented in their report which can be obtained from the Maryland State Highway Administration or from the following URL: http://www.gishydro.umd.edu/HydroPanel/panel_report_103106.pdf (University of Maryland 2006).

Results of Dr. Moglen's hydrologic analysis are listed below in Table 2, "Summary of Discharges".

TABLE 2 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (mi^2)	EXCEEDENCE PROBABILITY DISCHARGE (cfs) 10-PERCENT ANNUAL CHANCE	2-PERCENT ANNUAL CHANCE	1-PERCENT ANNUAL CHANCE	1-PERCENT ANNUAL CHANCE ULTIMATE*	0.2-PERCENT ANNUAL CHANCE
HIGGINS CREEK						
Approx. 4,925 feet upstream of Linkwood Road	N/A	359	682	880	880	1,530
Approx. 900 feet downstream of Linkwood Road	N/A	460	900	1,160	1,160	2,020
Upstream of Higgins Millpond Dam	N/A	551	1,050	1,340	1,340	2,270
MARSHY HOPE CREEK						
Approx. 130 feet downstream of confluence of Miles Branch	157.02	4,830	8,330	10,100	10,100	14,800
Approx. 3,675 feet downstream of confluence of Miles Branch	157.54	4,860	8,390	10,200	10,200	14,900
WRIGHT'S BRANCH						
Just downstream of Delaware Avenue	0.35	26	51	68	68	130

*- 1-Percent Annual Chance Ultimate Exceedance Probability Discharge

TABLE 5 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cubic feet per second) 10% Annual-Chance	2% Annual-Chance	1% Annual-Chance	0.2% Annual-Chance
HUNTING CREEK					
Approximately 450 feet downstream of Preston Road	8.68	567	1,128	1,455	2,504

This Countywide Revision

No new detailed hydrologic analyses were carried out for this countywide study.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods for the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data table in the FIS report (Exhibit 1 and Table 5). Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS report in conjunction with the data shown on the FIRM.

The hydraulic analyses for this countywide FIS were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if the hydraulic structures remain unobstructed, operate properly, and do not fail.

May 24, 2011 Countywide Analyses

A triangulated irregular network (TIN), which is a 3-D model of a ground surface, was created from Light Detection and Ranging (LiDAR) data provided by the Maryland Department of Natural Resources. Cross sections for the backwater analyses were obtained from this TIN. The below-water portions of the cross sections were either obtained from the effective hydraulic models, which were originally obtained by field survey or from sounding maps, or estimated from the thalwag on the Flood Profile sheet in the effective FIS if the effective hydraulic model was not found. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

All bridges and culverts in the original hydraulic models were surveyed to obtain elevation data and structural geometry. In an effort to identify any bridges that had been modified since the original FIS had been conducted, USACE contacted the MDE and Dorchester County to acquire the most recent data on all bridges and culverts. The data from MDE and Dorchester County were compared to the effective hydraulic models and if a difference existed, the bridge data were replaced with the more recent information. There were several bridges and culverts for which MDE or Dorchester County did not have data. For these crossings, USACE conducted a field survey to acquire the data required to model the bridge or culvert. (Note: there are bridges and culverts that have been built since the previous study for which USACE could not obtain any information. No information on these new stream crossings was available from either MDE or Dorchester County, and USACE could not gain access to the bridges or culverts due to fences around private property, or due to safety concerns. Notes have been added to the hydraulic models for any stream with this situation.)

Water-surface elevations for floods of the selected recurrence intervals were computed through use of the USACE Hydrologic Engineering Centers River Analysis System (HEC-RAS Version 3.1.3) step-backwater computer program.

Starting water-surface elevations were calculated using the slope-area method for most detailed study streams. Where the detailed study began at an existing structure with known backwater effects, the headwater elevation for each frequency flood was acquired from the effective FIS and used as the starting water surface elevation in the hydraulic analysis.

Channel and over bank roughness factors (Manning's "n" values) used in the original hydraulic computations were chosen by engineering judgment and were based on field observations of the stream and floodplain areas. These values were used in the updated hydraulic analyses when available. Roughness values for the main channels and over banks of smaller streams ranged from 0.030 to 0.060 and 0.048 to 0.125 respectively.

This Countywide Revision

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

No new hydraulic analyses were carried out for this countywide study. Detail-studied streams previously studied as part of previous map updates may include a "profile baseline" on the maps. This profile baseline provides a link to the flood profiles included in the FIS report. The detail studied stream centerline may have been digitized or redelineated as part of this revision. The profile baselines for these streams were based on the best available data at the time of their study and are depicted as they were on the previous FIRMs. In some cases where improved topographic data was used to redelineate floodplain boundaries, the profile baseline may deviate significantly from the channel centerline or may be outside the SFHA.

Qualifying bench marks within a given jurisdiction are cataloged by the NGS and entered into the National Spatial Reference System (NSRS). First or Second Order Vertical bench marks that have a vertical stability classification of A, B, or C are shown and labeled on the FIRM with their 6-character NSRS Permanent Identifier.

Bench marks cataloged by the NGS and entered into the NSRS vary widely in vertical stability classification. NSRS vertical stability classifications are as follows:

- Stability A: Monuments of the most reliable nature, expected to hold position/elevation well (e.g., mounted in bedrock)

- Stability B: Monuments which generally hold their position/elevation well (e.g., concrete bridge abutments)

- Stability C: Monuments which may be affected by surface round monuments (e.g., concrete mounted below frost line)

- Stability D: Mark of questionable or unknown vertical stability (e.g., concrete monument above frost line or steel witness post)

In addition to NSRS bench marks, the FIRM may also show vertical control monument established by a local jurisdiction; these monuments will be shown on the FIRM with the appropriate designations. Local monuments will only be placed on the FIRM if the community has requested that they be included, and if the monuments meet the aforementioned NSRS inclusion criteria.

To obtain current elevation, description, and/or location information for bench marks shown on the FIRM, please contact the NGS Information Services Branch at (301) 713-3242 or visit their website, www.ngs.noaa.gov.

It is important to note that temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purposes of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with this FIS and FIRM. Interested individuals may contact FEMA to access this data.

3.3 Coastal Analysis

Coastal analysis, considering storm characteristics and the shoreline and bathymetric characteristics of the flooding sources studied, were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along the shoreline. Users of the FIRM should be aware that coastal flood elevations are provided in Table 3, "Summary of Stillwater Elevations" table in this report. If the elevation on the FIRM is higher than the elevation shown in this table, a wave height, wave runup, and/or wave setup component likely exists, in which case, the higher elevation should be used for construction and/or floodplain management purposes.

Residential and agricultural development encompasses much of the shoreline within Dorchester County with the exception of a few commercial areas. Shorelines are primarily low marshes, with some low bluffs between 2 to 15 feet NAVD88 in height, in far northern and eastern areas. Behind the shoreline, the ground slopes gently upward into open woodlands or agricultural areas.

An analysis was performed to establish the frequency peak elevation relationships for coastal flooding in Dorchester County. The FEMA Region III office initiated a study in 2008 to update the coastal storm surge elevations within the states of Virginia, Maryland, and Delaware, and the District of Columbia including the Atlantic Ocean, Chesapeake Bay including its tributaries, and the Delaware Bay. The study replaces outdated coastal storm surge stillwater elevations for all FISs in the study area, including Dorchester County, and serves as the basis for updated FIRMs. Study efforts were initiated in 2008 and concluded in 2012.

The storm surge study was conducted for FEMA by the USACE and its project partners under Project HSFE03-06-X-0023, “NFIP Coastal Storm Surge Model for Region III” and Project HSFE03-09-X-1108, “Phase II Coastal Storm Surge Model for FEMA Region III”. The work was performed by the Coastal Processes Branch (HF-C) of the Flood and Storm Protection Division (HF), U.S. Army Engineer Research and Development Center – Coastal & Hydraulics Laboratory (ERDC-CHL).

The end-to-end storm surge modeling system includes the Advanced Circulation Model for Oceanic, Coastal and Estuarine Waters (ADCIRC) for simulation of 2-dimensional hydrodynamics (Luettich et. al 2008). ADCIRC was dynamically coupled to the unstructured numerical wave model Simulating WAves Nearshore (unSWAN) to calculate the contribution of waves to total storm surge (USACE 2012). The resulting model system is typically referred to as SWAN+ADCIRC (USACE 2012). A seamless modeling grid was developed to support the storm surge modeling efforts. The modeling system validation consisted of a comprehensive tidal calibration followed by a validation using carefully reconstructed wind and pressure fields from three major flood events for the Region III domain: Hurricane Isabel, Hurricane Ernesto, and extratropical storm Ida. Model skill was accessed by quantitative comparison of model output to wind, wave, water level and high water mark observations.

The tidal surge for those estuarine areas affected by Chesapeake Bay and Tangier Sound affect the entire shoreline within Dorchester County. The entire open coastline, from the confluence with the Choptank River to Fishing Bay, is more prone to damaging wave action during high wind events due to the significant fetch over which winds can operate. Inland from the mouths of these water bodies, as well as Little Choptank River, Honga River, Hooper Strait and the Nanticoke River, river widths narrow considerably as they converge with non-tidal tributaries. In this area, the fetch over which winds can operate for wave generation is significantly less. The storm-surge elevations for the 10-, 2-, 1-, and 0.2-percent chance floods determined for the Chesapeake Bay are shown in Table 3, “Summary of Stillwater Elevations.” The analyses reported herein reflect the stillwater elevations due to tidal and wind setup effects.

TABLE 3 - SUMMARY OF STILLWATER ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION (feet NAVD88*) 10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
CHESAPEAKE BAY				
At Rioll Cove	3.1	3.7	3.9	4.3
At Charity Point	3.1	3.6	3.8	4.7
At Nancy's Point	3.2	3.7	3.8	4.6
CHOPTANK RIVER				
At Castle Haven Point	3.4	3.9	4.1	4.7
At Cambridge	3.5	4.1	4.3	5.0
LITTLE CHOPTANK RIVER				
At Casson Point	3.2	3.7	3.9	4.4
At Smith Cove	3.3	3.8	4.0	4.6
HONGA RIVER				
At Crab Point	3.2	3.8	4.0	4.8
FISHING BAY				
At Elliot's Island	3.9	4.6	4.8	5.3
HOOPER STRAIT				
At Hopkins Cove	3.4	3.9	4.2	4.7
NANTICOKE RIVER				
At Mulberry Point	4.0	4.8	5.0	5.8
At Upper Greens Cove	4.3	5.3	5.6	6.4

*North American Vertical Datum of 1988

The methodology for analyzing the effects of wave heights associated with coastal storm surge flooding is described in a report prepared by the National Academy of Sciences (NAS) (NAS 1977). This method is based on three major concepts. First, depth-limited waves in shallow water reach maximum breaking height that is equal to 0.78 times the stillwater depth. The wave crest is 70 percent of the total wave height above the stillwater level. The second major concept is that wave height may be diminished by dissipation of energy due to the presence of obstructions, such as sand dunes, dikes and seawalls, buildings and vegetation. The amount of energy dissipation is a function of the physical characteristics of the obstruction and is determined by procedures prescribed in NAS Report. The third major concept is that wave height can be regenerated in open fetch areas due to the transfer of wind energy to the water. This added energy is related to fetch length and depth.

The coastal analysis and mapping for Dorchester County was conducted for FEMA by RAMPP under contract No. HSFEHQ-09-D-0369, Task Order HSFE03-09-0002. The coastal analysis involved transect layout, field reconnaissance, erosion analysis, and overland wave modeling including wave setup, wave height analysis and wave runup.

Wave heights were computed across transects that were located along coastal areas of Dorchester County, as illustrated on the FIRM. The transects are located with consideration given to existing transect locations and to the physical and cultural characteristics of the land so that they would closely represent conditions in the locality.

Each transect was taken perpendicular to the shoreline and extended inland to a point where coastal flooding ceased. Along each transect, wave heights and elevations were computed considering the combined effects of changes in ground elevation, vegetation, and physical features. The stillwater elevations for a 1% annual chance event were used as the starting elevations for these computations. Wave heights were calculated to the nearest 0.1 foot, and wave elevations were determined at whole-foot increments along the transects. The location of the 3-foot breaking wave for determining the terminus of the Zone VE (area with velocity wave action) was computed at each transect. Along the open coast, the Zone VE designation applies to all areas seaward of the landward toe of the primary frontal dune system. The primary frontal dune is defined as the point where the ground profile changes from relatively steep to relatively mild.

Due to the low marshy nature, dune erosion was not taken into account along the Chesapeake Bay coastline. A review of the geology and shoreline type in Dorchester County was made to determine the applicability of standard erosion methods, and FEMA's standard erosion methodology for coastal areas having primary frontal dunes, referred to as the "540 rule," was used (FEMA 2007a). This methodology first evaluates the dune's cross-sectional profile to determine whether the dune has a reservoir of material that is greater or less than 540 square feet. If the reservoir is greater than 540 square feet, the "retreat" erosion method is employed and approximately 540 square feet of the dune is eroded using a standardized eroded profile, as specified in FEMA guidelines. If the reservoir is less than 540 square feet, the "remove" erosion method is employed where the dune is removed for subsequent analysis, again using a standard eroded profile. The storm surge study provided the return period stillwater elevations required for erosion analyses. Each cross-shore transect was analyzed for erosion, when applicable.

Wave height calculations used in this study follow the methodologies described in the FEMA guidance for coastal mapping (FEMA 2007a). Wave setup results in an increased water level at the shoreline due to the breaking of waves and transfer of momentum to the water column during hurricanes and severe storms. For the Dorchester County study, wave setup was determined directly from the coupled wave and storm surge model The total stillwater elevation (SWEL) with wave setup was then used for simulations of inland wave propagation conducted using FEMA's Wave Height Analysis for Flood Insurance Studies (WHAFIS) model Version 4.0 (FEMA 2007b). WHAFIS is a one-dimensional model that was applied to each transect in the study area. The model uses the specified SWEL, the computed wave setup, and the starting wave conditions as input. Simulations of wave transformations were then conducted with WHAFIS taking into account the storm-induced erosion and overland features of each transect. Output from the model includes the combined SWEL and wave height along each cross-shore transect allowing for the establishment of base flood elevations (BFEs) and flood zones from the shoreline to points inland within the study area.

Wave runup is defined as the maximum vertical extent of wave uprush on a beach or structure. FEMA's 2007 Guidelines and Specifications require the 2% wave runup level be computed for the coastal feature being evaluated (cliff, coastal bluff, dune, or structure) (FEMA 2007a). The 2% runup level is the highest 2 percent of wave runup affecting the shoreline during the 1-percent-annual-chance flood event. Each transect defined within the Region III study area was evaluated for the applicability of wave runup, and if necessary, the appropriate runup methodology was selected and applied to each transect. Runup elevations were then compared to WHAFIS results to determine the dominant process affecting BFEs and associated flood hazard levels. Based on wave runup rates, wave overtopping was computed following the FEMA 2007 Guidelines and Specifications.

Computed controlling wave heights at the shoreline range from 0.6 feet at embayments where the fetch is short to 3.9 feet at the southern end where the fetch is longer. The corresponding wave elevation at the shoreline varies from 4.4 feet NAVD88 at the northern end to 8.4 feet NAVD88 at the southern end.

Between transects, elevations were interpolated using topographic maps, land-use and land cover data, and engineering judgment to determine the aerial extent of flooding. The results of the calculations are accurate until local topography, vegetation, or cultural development within the community undergo major changes. Table 4, "Transect Data", provides the Nanticoke River, Fishing Bay, Hooper Strait, the Honga River, the Chesapeake Bay, Tar Bay, and the Little Choptank River's 10%, 2%, 1% and 0.2% annual chance stillwater elevations and the starting wave conditions for each transect. Figure 2, "Transect Location Map", provides an illustration of the transect locations.

TABLE 4 - TRANSECT DATA								
		Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)			
Flood Source	Transect	Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Nanticoke River	1	N 38.349335 W -75.900029	3.5	3.7	4.3	5.3	5.6	6.4
Nanticoke River	2	N 38.325516 W -75.920317	3.6	3.7	4.2	5.1	5.4	6.2
Nanticoke River	3	N 38.311081 W -75.936064	3.4	3.4	4.1	5.0	5.2	6.0
Nanticoke River	4	N 38.287110 W -75.936168	3.4	3.6	4.1	4.9	5.1	5.9
Nanticoke River	5	N 38.269018 W -75.945912	4.0	4.2	4.0	4.8	5.0	5.8
Nanticoke River	6	N 38.251119 W -75.951457	3.7	4.1	4.0	4.7	4.9	5.6
Nanticoke River	7	N 38.237650 W -75.952280	4.6	4.3	3.9	4.6	4.8	5.5
Fishing Bay	8	N 38.253382 W -75.964721	4.4	4.5	3.9	4.7	4.9	5.6
Fishing Bay	9	N 38.265878 W -75.983057	4.8	4.5	3.9	4.6	4.9	5.6
Fishing Bay	10	N 38.287165 W -75.994248	4.9	4.3	3.9	4.7	4.9	5.6
Fishing Bay	11	N 38.301255 W -76.006967	4.6	4.3	3.9	4.7	5.0	5.6
Fishing Bay	12	N 38.311191 W -76.012883	3.2	3.7	3.9	4.6	4.9	5.4
Fishing Bay	13	N 38.314103 W -75.992073	3.1	3.2	4.0	4.7	5.0	5.7
Fishing Bay	14	N 38.320189 W -75.969349	3.3	3.3	4.1	4.9	5.2	6.0

TABLE 4 – TRANSECT DATA - continued								
		Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)			
Flood Source	Transect	Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Fishing Bay	15	N 38.332678 W -75.961432	3.3	3.3	4.1	5.0	5.3	6.2
Fishing Bay	16	N 38.355062 W -75.968566	3.3	3.4	4.2	5.1	5.4	6.3
Fishing Bay	17	N 38.369152 W -75.989202	3.5	3.6	4.2	5.1	5.4	6.2
Fishing Bay	18	N 38.363149 W -76.011056	3.5	3.7	4.1	4.9	5.2	5.9
Fishing Bay	19	N 38.339040 W -76.016102	3.3	3.5	4.0	4.7	4.9	5.6
Fishing Bay	20	N 38.323069 W -76.036390	3.5	3.5	3.9	4.6	4.8	5.5
Fishing Bay	21	N 38.305064 W -76.063116	2.7	3.2	3.8	4.4	4.6	5.2
Fishing Bay	22	N 38.299958 W -76.043802	3.5	3.8	3.8	4.5	4.7	5.3
Fishing Bay	23	N 38.284143 W -76.030213	4.6	4.5	3.8	4.4	4.6	5.2
Fishing Bay	24	N 38.271240 W -76.042915	3.7	4.7	3.8	4.4	4.6	5.2
Fishing Bay	25	N 38.259013 W -76.039087	4.9	4.6	3.7	4.3	4.6	5.1
Fishing Bay	26	N 38.246041 W -76.052224	2.6	4.2	3.7	4.3	4.5	5.0
Fishing Bay	27	N 38.235401 W -76.041001	4.6	4.4	3.6	4.2	4.4	5.1

TABLE 4 – TRANSECT DATA - continued								
		Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)			
Flood Source	Transect	Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Hooper Strait	28	N 38.220276 W -76.038304	4.4	3.9	3.4	4.0	4.2	4.8
Hooper Strait	29	N 38.227832 W -76.052659	4.5	3.9	3.3	3.9	4.1	4.7
Hooper Strait	30	N 38.236008 W -76.067118	4.8	5.1	3.3	3.8	4.0	4.7
Hooper Strait	31	N 38.252182 W -76.075852	3.7	4.5	3.3	3.9	4.1	5.0
Honga River	32	N 38.255011 W -76.088641	4.6	4.6	3.3	3.8	4.1	5.0
Honga River	33	N 38.261704 W -76.087162	2.3	2.6	3.3	3.8	4.0	4.9
Honga River	34	N 38.270191 W -76.077592	2.0	2.4	3.3	3.9	4.1	5.1
Honga River	35	N 38.280003 W -76.082638	2.1	2.9	3.4	3.9	4.2	5.3
Honga River	36	N 38.280003 W -76.097080	3.1	3.0	3.3	3.9	4.1	5.2
Honga River	37	N 38.292230 W -76.101012	3.0	3.8	3.4	4.0	4.2	5.5
Honga River	38	N 38.302028 W -76.106058	1.6	2.6	3.4	4.0	4.2	5.6
Honga River	39	N38.300041 W-76.120169	3.2	3.8	3.5	4.0	4.2	5.6
Honga River	40	N 38.282984 W -76.130104	3.6	3.7	3.4	3.8	4.1	5.2
Honga River	41	N 38.277050 W -76.142719	3.5	3.6	3.3	3.8	4.0	5.0

TABLE 4 – TRANSECT DATA - continued								
		Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)			
Flood Source	Transect	Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Honga River	42	N 38.287814 W -76.145503	2.7	2.9	3.3	3.8	4.0	4.9
Honga River	43	N 38.311633 W -76.138195	2.6	2.9	3.4	3.9	4.1	5.3
Honga River	44	N 38.320134 W -76.168749	3.2	3.4	3.4	3.9	4.1	5.1
Honga River	45	N 38.324412 W -76.197998	3.3	3.4	3.4	3.9	4.1	5.0
Honga River	46	N 38.334086 W -76.185209	2.7	3.1	3.4	4.0	4.2	5.2
Honga River	47	N 38.353213 W -76.178423	2.5	2.9	3.5	4.1	4.3	5.4
Honga River	48	N 38.363094 W -76.194361	3.0	3.3	3.6	4.1	4.4	5.6
Honga River	49	N 38.366199 W -76.210108	3.2	3.5	3.6	4.2	4.4	5.6
Honga River	50	N 38.392102 W -76.219956	2.1	2.8	3.7	4.3	4.6	5.8
Honga River	51	N 38.377267 W -76.233180	2.4	3.4	3.6	4.3	4.5	5.6
Honga River	52	N 38.354607 W -76.230239	2.9	3.4	3.5	4.1	4.3	5.3
Honga River	53	N 38.335273 W -76.215606	2.9	3.4	3.4	4.0	4.2	5.1
Honga River	54	N 38.317181 W -76.221087	3.0	3.4	3.3	3.9	4.1	5.0
Honga River	55	N 38.311578 W -76.221435	3.2	3.4	3.3	3.9	4.1	4.8

TABLE 4 – TRANSECT DATA - continued								
Flood Source	Transect	Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)			
		Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Honga River	56	N 38.294176 W -76.193752	2.6	3.2	3.2	3.8	4.0	4.7
Honga River	57	N 38.295142 W -76.170332	2.8	3.2	3.3	3.8	4.0	4.8
Honga River	58	N 38.280914 W -76.182338	3.1	3.5	3.3	3.9	4.1	4.9
Honga River	59	N 38.267169 W -76.180076	2.0	3.9	3.2	3.8	4.0	4.7
Honga River	60	N 38.248111 W -76.158222	3.0	3.2	3.2	3.7	3.9	4.5
Chesapeake Bay	61	N 38.232089 W -76.137238	6.0	5.8	3.2	3.7	3.9	4.6
Chesapeake Bay	62	N 38.260200 W -76.181816	3.6	6.3	3.2	3.7	3.9	4.6
Chesapeake Bay	63	N 38.278016 W -76.191403	3.5	5.4	3.2	3.6	3.8	4.6
Chesapeake Bay/ Tar Bay	64	N 38.312116 W -76.226916	2.8	5.1	3.1	3.6	3.8	4.5
Chesapeake Bay/ Tar Bay	65	N 38.327034 W -76.231805	2.7	3.3	3.1	3.6	3.8	4.5
Chesapeake Bay/ Tar Bay	66	N 38.336018 W -76.234415	2.7	3.0	3.0	3.6	3.8	4.5
Chesapeake Bay/ Tar Bay	67	N 38.345140 W -76.233023	2.7	3.1	3.1	3.6	3.9	4.7
Chesapeake Bay/ Tar Bay	68	N 38.356125 W -76.243132	2.8	3.3	3.1	3.6	3.9	4.7
Chesapeake Bay/ Tar Bay	69	N 38.371064 W -76.259557	2.3	3.6	3.1	3.6	3.8	4.6

TABLE 4 – TRANSECT DATA - continued								
		Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)			
Flood Source	Transect	Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Chesapeake Bay	70	N 38.379068 W -76.272346	3.7	4.9	3.0	3.5	3.7	4.2
Chesapeake Bay	71	N 38.393882 W -76.282281	3.8	4.8	3.0	3.5	3.6	4.1
Chesapeake Bay	72	N 38.412299 W -76.282716	4.1	4.9	3.0	3.5	3.7	4.2
Chesapeake Bay	73	N 38.442549 W -76.302656	4.3	5.0	3.0	3.6	3.7	4.3
Chesapeake Bay	74	N 38.462090 W -76.322651	4.4	5.8	3.0	3.6	3.7	4.2
Chesapeake Bay	75	N 38.474411 W -76.332261	4.2	5.4	3.1	3.6	3.7	4.2
Chesapeake Bay	76	N 38.492078 W -76.324077	2.4	5.8	3.1	3.7	3.8	4.3
Little Choptank River	77	N 38.497874 W -76.318973	2.0	2.6	3.1	3.7	3.8	4.3
Little Choptank River	78	N 38.502058 W -76.293259	2.4	2.9	3.0	3.7	3.8	4.3
Little Choptank River	79	N 38.491816 W -76.276327	1.3	2.2	3.0	3.7	3.8	4.2
Little Choptank River	80	N 38.507134 W -76.261437	1.8	2.6	3.1	3.7	3.8	4.3
Little Choptank River	81	N 38.519016 W -76.252795	2.1	2.9	3.1	3.7	3.9	4.4

TABLE 4 – TRANSECT DATA - continued								
		Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)			
Flood Source	Transect	Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Little Choptank River	82	N 38.522259 W -76.237395	2.1	2.9	3.1	3.7	3.9	4.4
Little Choptank River	83	N 38.512806 W -76.219777	1.5	2.3	3.2	3.7	3.9	4.4
Little Choptank River	84	N 38.535038 W -76.221625	2.2	2.8	3.2	3.7	3.9	4.3
Little Choptank River	85	N 38.534003 W -76.199167	1.4	2.3	3.2	3.8	3.9	4.3
Little Choptank River	86	N 38.547044 W -76.214479	1.9	2.8	3.2	3.8	3.9	4.4
Little Choptank River	87	N 38.561479 W -76.192567	1.5	2.3	3.3	3.8	4.0	4.6
Little Choptank River	88	N 38.567737 W -76.212983	1.8	2.7	3.3	3.8	4.0	4.5
Little Choptank River	89	N 38.559009 W -76.224793	1.6	2.6	3.3	3.8	4.0	4.4
Little Choptank River	90	N 38. 545057 W -76. 239771	2.2	3.0	3.2	3.8	3.9	4.4
Little Choptank River	91	N 38.548162 W -76.259131	2.4	3.0	3.2	3.8	3.9	4.4

TABLE 4 – TRANSECT DATA - continued								
		Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)			
Flood Source	Transect	Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Chesapeake Bay	92	N 38.547127 W -76.275799	3.6	3.6	3.2	3.7	3.9	4.4
Chesapeake Bay	93	N 38.560251 W -76.280903	3.7	3.5	3.2	3.8	3.9	4.3
Chesapeake Bay	94	N 38.569014 W -76.290231	3.4	3.8	3.2	3.8	4.0	4.4
Chesapeake Bay	95	N 38.577101 W -76.297113	3.7	4.4	3.2	3.8	3.9	4.3
Chesapeake Bay	96	N 38.582221 W -76.270343	2.1	2.7	3.2	3.8	4.0	4.4
Chesapeake Bay	97	N 38.595400 W -76.270079	2.2	3.7	3.2	3.8	4.0	4.5
Chesapeake Bay	98	N 38.619695 W -76.281944	3.6	4.4	3.3	3.9	4.1	4.6
Choptank River	99	N 38.616059 W -76.262247	2.1	2.4	3.3	3.9	4.1	4.5
Choptank River	100	N 38.624270 W -76.251933	2.6	3.2	3.3	3.9	4.1	4.6
Choptank River	101	N 38.612988 W -76.236057	1.8	2.7	3.3	3.9	4.1	4.7
Choptank River	102	N 38.609780 W -76.217753	1.8	2.5	3.3	3.9	4.1	4.5
Choptank River	103	N 38.615024 W -76.198111	2.3	2.8	3.4	3.9	4.1	4.6
Choptank River	104	N 38.624477 W -76.182077	2.7	3.1	3.4	3.9	4.1	4.7
Choptank River	105	N 38.615162 W -76.164917	2.3	3.0	3.4	4.0	4.1	4.6

TABLE 4 – TRANSECT DATA - continued								
		Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)			
Flood Source	Transect	Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Choptank River	106	N 38.601086 W -76.181813	1.2	2.3	3.3	3.9	4.1	4.6
Choptank River	107	N 38.594931 W -76.160921	1.7	2.6	3.4	3.9	4.1	4.6
Choptank River	108	N 38.605350 W -76.141473	2.1	3.0	3.4	4.0	4.1	4.7
Choptank River	109	N 38.594310 W -76.131057	1.9	2.7	3.4	4.0	4.1	4.7
Choptank River	110	N 38.585064 W -76.118575	2.2	2.7	3.4	4.0	4.1	4.7
Choptank River	111	N 38.580096 W -76.111147	1.2	2.4	3.3	3.9	4.0	4.6
Choptank River	112	N 38.585202 W -76.107275	1.7	2.4	3.4	4.0	4.2	4.7
Choptank River	113	N 38.587134 W -76.102611	2.1	2.5	3.4	4.0	4.2	4.8
Choptank River	114	N 38.591136 W -76.094251	2.2	2.8	3.5	4.0	4.2	4.8
Choptank River	115	N 38.586016 W -76.087369	2.3	3.1	3.5	4.0	4.2	4.7
Choptank River	116	N 38.584705 W -76.078041	2.4	3.0	3.5	4.0	4.2	4.8
Choptank River	117	N 38.577391 W -76.075665	2.4	2.8	3.5	4.0	4.2	4.8
Choptank River	118	N 38.573182 W -76.071265	2.4	2.8	3.5	4.0	4.2	4.8
Choptank River	119	N 38.573044 W-76.065809	2.2	2.8	3.5	4.1	4.2	4.8

TABLE 4 – TRANSECT DATA - continued								
		Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations (ft NAVD88)			
Flood Source	Transect	Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Choptank River	120	N 38.568076 W -76.058241	2.0	2.7	3.5	4.1	4.2	4.8
Choptank River	121	N 38.564336 W -76.049933	2.0	2.6	3.5	4.1	4.2	4.9
Choptank River	122	N 38.562128 W -76.040693	2.0	2.6	3.5	4.1	4.3	4.9
Choptank River	123	N 38.565509 W -76.030133	2.0	2.7	3.6	4.1	4.3	4.9
Choptank River	124	N 38.566475 W -76.019907	2.2	2.8	3.6	4.1	4.3	5.0
Choptank River	125	N 38.573251 W -76.006319	2.1	2.8	3.6	4.2	4.4	5.1
Choptank River	126	N 38.582014 W -76.001039	2.0	2.9	3.7	4.2	4.4	5.1
Choptank River	127	N 38.583132 W -75.984301	2.0	2.7	3.7	4.3	4.5	5.2
Choptank River	128	N 38.591550 W -75.977525	2.0	2.7	3.7	4.3	4.5	5.3
Choptank River	129	N 38.608055 W -75.973195	2.2	3.0	3.7	4.4	4.6	5.4
Choptank River	130	N 38.615024 W -75.973635	2.3	3.1	3.8	4.4	4.6	5.4
Choptank River	131	N 38.654041 W -75.952779	2.0	3.1	3.8	4.7	4.9	5.7

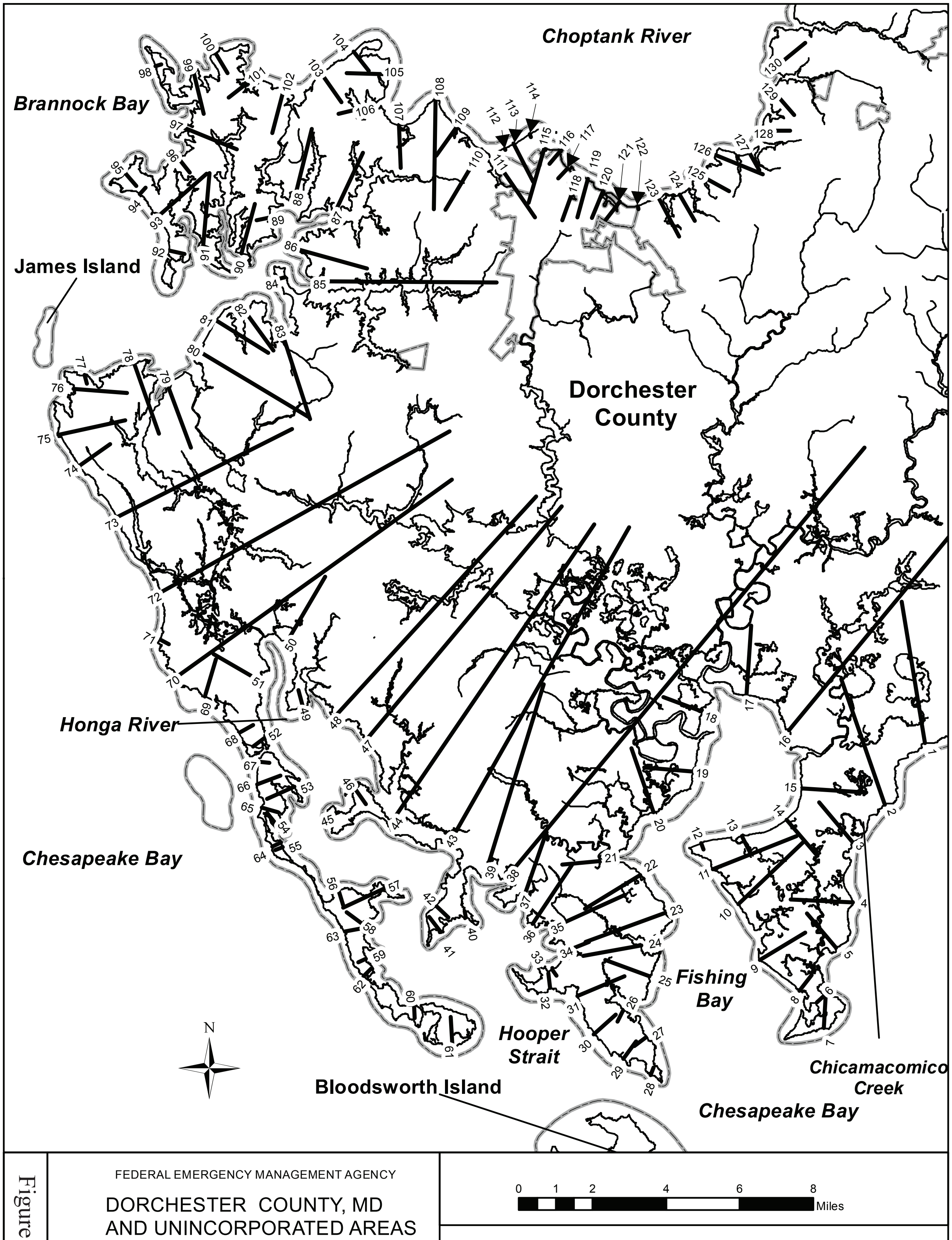

Figure 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

DORCHESTER COUNTY, MD
AND UNINCORPORATED AREAS

TRANSECT LOCATION MAP

Tidal Hydrology

Prior to the May 24, 2011 FIS, the effective tidal elevations from the previous FISs for the City of Cambridge, the Towns of Church Creek, Hurlock, and Secretary, and the unincorporated areas of Dorchester County, were used (FEMA 1980a, 1988, 1998, 1980b, 1992, and 1981). Those effective tidal elevations were converted from the National Geodetic Vertical Datum of 1929 (NGVD29) to the North American Vertical Datum of 1988 (NAVD88), then redelineated onto updated topography data.

For the May 24, 2011 study, the tidal elevations for the Warwick River, Church Creek, and the Chesapeake Bay were determined for various frequency relationships by the VIMS (VIMS 1978). The relationships were computed using a finite element, hydrodynamic computer model of the Chesapeake Bay and the Virginia offshore area of the Atlantic Ocean. The model utilized meteorologic, topographic, and bathymetric input to generate and modify storm surges. This general input included the astronomical tide, the inverted barometer effect, wind stress acting on water-surface, coastal configurations, bottom topography, bottom friction, internal stress, and discharge and surface elevations of rivers. The compilation and analysis of this data were accomplished using a high-speed digital computer which forecasted peak elevations. Bathymetric data were derived from standard bathymetric charts published by the U.S. Coast and Geodetic Survey (USCGS), now the National Geodetic Survey (NGS) (USCGS 1944).

3.4 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the finalization of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in differences in Base Flood Elevations (BFEs) across the corporate limits between the communities. The vertical datum conversion factor from NGVD29 to NAVD88 for Dorchester County is –0.76 feet. For example, a BFE of 12.4 will appear as 12 on the FIRM and 12.6 will appear as 13. Therefore, users that wish to convert the elevations in this FIS to NGVD29 should apply the stated conversion factor to elevations shown in this FIS report, which are shown at a minimum to the nearest 0.1 foot.

For more information on NAVD88, see FEMA publication entitled, Converting the National Flood Insurance Program to the North American Vertical Datum of 1988, FEMA Publication FIA-20/June 1992, or contact the NGS on their Website (http://www.ngs.noaa.gov) or at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program (NFIP) encourages state and local governments to adopt sound floodplain management programs. Therefore, each FIS produces maps designed to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 1- and 0.2-percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections the boundaries were interpolated using the TIN discussed in Section 3.2. The 1-percent-annual-chance floodplain boundary is shown on the FIRM (Exhibit 1).

Areas of coastline subject to significant wave attack are referred to as coastal high hazard zones. The USACE has established the 3-foot breaking wave as the criterion for identifying the limit of coastal high hazard zones (USACE, 1975). The 3-foot wave has been determined the minimum size wave capable of causing major damage to conventional wood frame of brick veneer structures. The one exception to the 3-foot wave criteria is where a primary frontal dune exists. The limit the coastal high hazard area then becomes the landward toe of the primary frontal dune or where a 3-foot or greater breaking wave exists, whichever is most landward. The coastal high hazard zone is depicted on the FIRMs as Zone VE, where the delineated flood hazard includes wave heights equal to or greater than three feet. Zone AE is depicted on the FIRMs where the delineated flood hazard includes wave heights less than three feet. A depiction of how the Zones VE and AE are mapped is shown in Figure 3, “Typical Transect Schematic”.

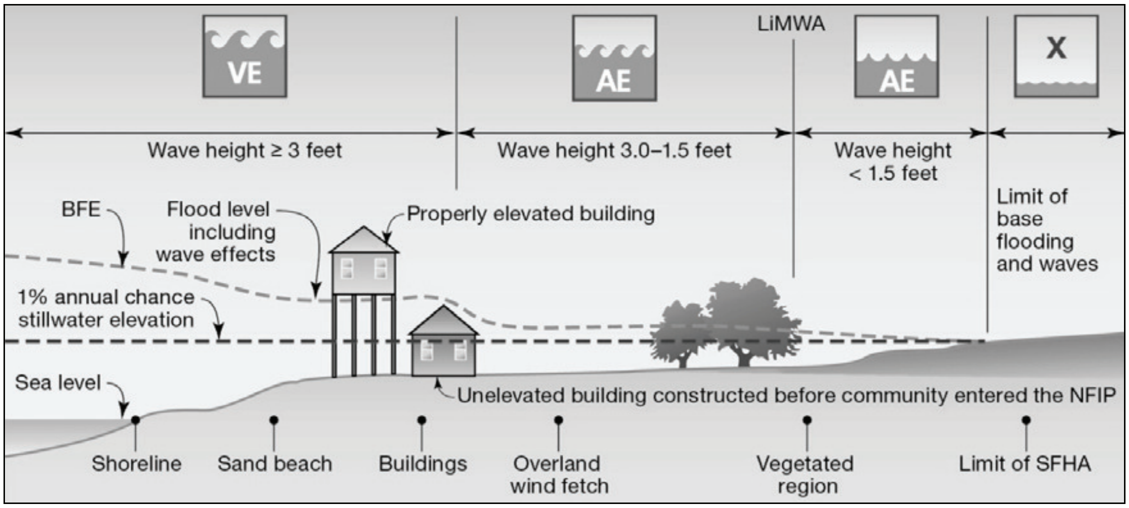

Figure 3 – Typical Transect Schematic

Post-storm field visits and laboratory tests have confirmed that wave heights as small as 1.5 feet can cause significant damage to structures when constructed without consideration to the coastal hazards. Additional flood hazards associated with coastal waves include floating debris, high velocity flow, erosion, and scour which can cause damage to Zone AE-type construction in these coastal areas. To help community officials and property owners recognize this increased potential for damage due to wave action in the AE zone, FEMA issued guidance in December 2008 on identifying and mapping the 1.5-foot wave height line, referred to as the Limit of Moderate Wave Action (LiMWA). While FEMA does not impose floodplain management requirements based on the LiMWA, the LiMWA is provided to help communicate the higher risk that exists in that area. Consequently, it is important to be aware of the area between this inland limit and the Zone VE boundary as it still poses a high risk, though not as high of a risk as Zone VE (see Figure 2).

The 1- and 0.2-percent annual chance floodplain boundaries are shown on the FIRMs (Exhibit 2). In cases where the 1- and 0.2-percent annual chance floodplain boundaries are close together, only the 1-percent annual chance boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to the limitations of the map scale.

For the streams studied by approximate methods only the 1-percent annual chance floodplain boundary is shown.

4.2 Floodways

Encroachment of floodplains, such as structures and fill, reduces the flood carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent annual chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1-percent annual chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced.

Prior to the May 24, 2011 FIS, the following streams had floodway analyses conducted as part of a previous FIS: Higgins Creek, Marshy Hope Creek, and Wright's Branch. The floodways presented in the effective FISs were computed on the basis of equal conveyance reduction from each side of the floodplain. No floodway was computed for the downstream portions of Higgins Creek, which is the area below Millpond Dam. The floodway shown on the effective map coincides with the shoreline and was consistent with the State of Maryland guidelines.

For the May 24, 2011 FIS, the USACE conducted floodway analyses for Higgins Creek, Marshy Hope Creek, and Wright's Branch. The objective of the floodway analyses was to update the floodways on the aforesaid streams. The floodways were computed on the basis of equal conveyance reduction from each side of the floodplain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was computed and are presented in Table 5, "Floodway Data".

As shown on the updated FIRM (Exhibit 2), the floodway boundaries were computed at cross sections. Between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 1-percent annual chance flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the 1-percent annual chance floodplain boundaries is termed the floodway fringe. The floodway fringe thus encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent annual chance flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4, "Floodway Schematic".

The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	78	130	604	2.7	5.3	5.3	5.6	0.3
B	286	108	462	3.1	5.5	5.5	5.9	0.4
C	466	60	411	3.5	5.7	5.7	6.3	0.6

1- Feet above Limit of Riverine Study*

2- This width is located entirely within Caroline County

*- Limit of Riverine Study is approximately 9,300 feet above Back Landing Road

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

DORCHESTER COUNTY, MD

AND INCORPORATED AREAS

FLOODWAY DATA

HUNTING CREEK

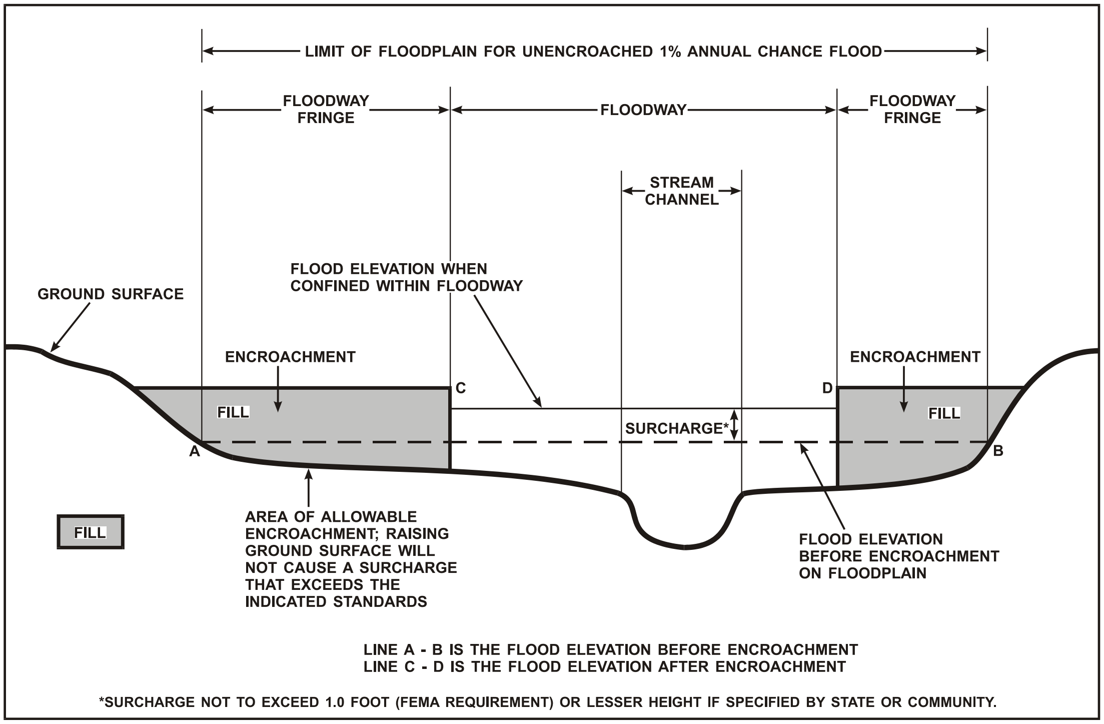

Figure 4 – Floodway Schematic

Table 5 – Floodway Data (please note: not included for this Preliminary FIS report)

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A:

Zone A is the flood insurance risk zone that corresponds to the 1-percent annual chance floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations (BFEs) or base flood depths are shown within this zone.

Zone AE:

Zone AE is the flood insurance risk zone that corresponds to the 1-percent annual chance floodplains that are determined in the FIS by detailed methods. In most instances, whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH:

Zone AH is the flood insurance risk zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO:

Zone AO is the flood insurance risk zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot base flood depths derived from the detailed hydraulic analyses are shown within this zone.

Zone AR:

Zone AR is the flood insurance risk zone that corresponds to an area of special flood hazard formerly protected from the 1-percent-annual-chance flood event by a flood-control system that was subsequently decertified. Zone AR indicates that the former flood-control system is being restored to provide protection from the 1-percent-annual-chance or greater flood event.

Zone A99:

Zone A99 is the flood insurance risk zone that corresponds to areas of the 1-percent-annual-chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No BFEs or depths are shown within this zone.

Zone V:

Zone V is the flood insurance risk zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no BFEs are shown within this zone.

Zone VE:

Zone VE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X:

Zone X is the flood insurance risk zone that corresponds to areas outside the 0.2-percent annual chance floodplain, areas within the 0.2-percent annual chance floodplain, areas of 1-percent annual chance flooding where average depths are less than 1 foot, areas of 1-percent annual chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent annual chance flood by levees. No BFEs or base flood depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance risk zones as described in Section 5.0 and, in the 1-percent annual chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 1- and 0.2-percent annual chance floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The current FIRM presents flooding information for the entire geographic area of Dorchester County. Historical data relating to the maps prepared for each community, prior to the May 24, 2011 countywide FIS, are presented in Table 6, ‘Community Map History.’

COMMUNITY NAME	INITIAL NFIP MAP DATE	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	INITIAL FIRM DATE	FIRM REVISIONS DATE
Brookview, Town of	December 6, 1974	December 19, 1975	January 7, 1977	
Cambridge, City of	October 18, 1974	September 26, 1975	January 16, 1981	
Church Creek, Town of	October 18, 1988	None	October 18, 1988	
Dorchester County (Unincorporated Areas)	January 10, 1975	None	October 15, 1981	June 16, 1992
East New Market, Town of [1]	None	None	None	
Eldorado, Town of	December 6, 1974	December 26, 1975	December 15, 1978	
Galestown, Town of [2]	July 11, 1975	None	None	
Hurlock, Town of	January 21, 1977	None	January 16, 1981	
Secretary, Town of	November 1, 1974	September 26, 1975	December 19, 1980	April 4, 1992
Vienna, Town of	November 8, 1974	None	December 15, 1978	

[1] No Special Flood Hazard Areas Identified
[2] This community did not have a FIRM prior to the first countywide FIRM for Dorchester County

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

DORCHESTER COUNTY, MD AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

A FIS is being conducted for Somerset County, Maryland, which borders Dorchester County on the south, and for Wicomico County, Maryland, which orders Dorchester County on the southeast.

This FIS report either supersedes or is compatible with all previous studies on streams studied in this report and should be considered authoritative for purposes of the NFIP.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Flood Insurance and Mitigation Division, Federal Emergency Management Agency, One Independence Mall, 6th floor, 615 Chestnut Street, Philadelphia, PA 19106.

9.0 BIBLIOGRAPHY AND REFERENCES

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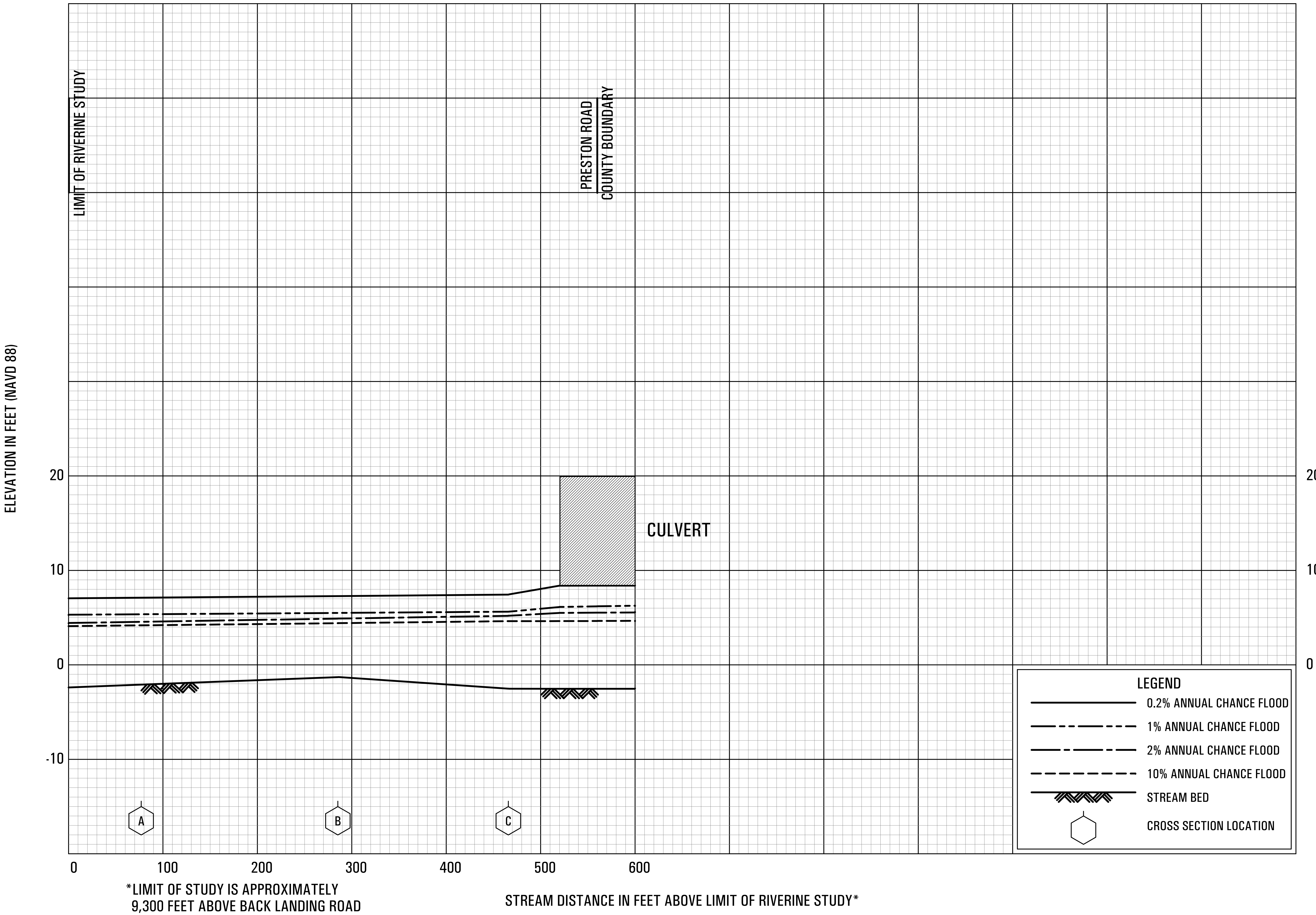

FLOOD PROFILES

HUNTING CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

DORCHESTER COUNTY, MD

AND INCORPORATED AREAS

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